



MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB PROGRESS REPORT

State of Montana

Project No. F-12-R-18

Title Fish Management Surveys

Job No. I-b

Title Georgetown Lake Winter Creel Census

Project period: July 1, 1971 - June 30, 1972

ABSTRACT

A creel census was conducted at Georgetown Lake during the 1971-72 ice-fishing season. An estimated 10,169 fishermen fished for 33,114 hours and harvested 54,954 fish. The total yield was 9.0 pounds per acre which is over 4.0 pounds per acre less than that taken during the 1966-67 and 1969-70 winter seasons.

Although rainbow trout remained the dominant species harvested, salmon increased from 14 percent of the catch in 1969-70 to over 36 percent during this season. The average length and weight of rainbow trout increased slightly from the 1970-71 winter census. The winter census data are compared to those obtained during five previous seasons. An additional salmon limit is recommended.

BACKGROUND

Georgetown Lake, due to its close proximity to heavily populated cities, has endured considerable fishing pressure in past years. Over 60,000 fishermen-days were estimated during the 1970-71 summer and winter fishing seasons. Subcatchable rainbow trout are planted annually while Arctic grayling, brook trout, and kokanee spawn within the lake or in tributaries. The heavy use and subsequent interest in Georgetown Lake makes it essential that trend information on the fisheries is obtained. A management plan for Georgetown Lake was initiated in 1970. Periodic creel census is called for in the plan to provide information for management of the Georgetown Lake fishery.

OBJECTIVES

The primary objective of this job is to determine fishermen use and harvest on Georgetown Lake during the 1971-72 winter ice-fishing season. Secondary objectives are to determine species composition of the catch, and average length, weight, and condition factors of these species for trend comparisons.

PROCEDURES

The 1971-72 Georgetown Lake winter ice-fishing season ran for 73 days from December 19, 1971 through February 29, 1972. Daily fishing hours ranged from 5:00 a.m. to 11:00 p.m. daily. Ten pounds and one fish not to exceed 10 fish of any game fish species was the established limit.

A total of 51 days, or 70 percent of the season, was censused. The census design followed that described by Spence (1970). A summary of the number of days censused, parties contacted, fishermen contacted, and car counts made is presented in Table 1. Three strata were sampled for separate estimates. Stratum I covered opening day only while stratum II and III covered weekends (holidays included) and weekdays, respectively. Of 23 weekend and holiday days, 22 (96%) were sampled, while 28 (57%) of 49 weekdays were sampled.

Six to nine car counts were run each sampling day on a randomly selected time basis. Between car counts, fishermen were individually contacted following completed fishing trips. Information from each individual angler on hours fished, species caught, and total number of fish caught was recorded. The majority of fish checked by the census technician were weighed to the nearest 0.01 pound and measured to the nearest 0.1 inch. The number of fishermen per car was also recorded.

TABLE 1. Miscellaneous statistical information obtained from the census by strata and for the entire season

	Stratum I Opening day	Stratum II Weekends	Stratum III Weekdays	Entire Season
No. of days in season	1	23	49	73
No. of hours in season	18	396	900	1314
No. of days sampled	1	22	28	51
No. of parties contacted	157	341	149	647
No. of fishermen contacted	334	776	257	1367
No. of car counts made	18	163	215	396
Average car count (\bar{c})	92.9	17.8	7.3	
Coefficient of Variation of \bar{c}	21.8%	9.0%	8.0%	
Average fishermen per car (\bar{m})	3.48	2.34	1.98	
Coefficient of Variation of \bar{m}	3.6%	2.8%	3.6%	
(Coefficient of correlation) (between hours fished and) (fish caught)	.1732	.2726	.2157	.2276

This winter, as in the winter of 1969-70 (Spence, 1970), the lake was divided into two segments to provide more detailed coverage of completed fisherman trips

and also to prevent extensive travel on icy roads. Each sampling day the census technician was instructed to census fishermen in one randomly selected segment only.

FINDINGS

Estimates for the 1971-72 winter ice-fishing season showed 10,169 fishermen fished 33,114 hours and harvested 54,954 fish (Table 2). Opening day accounted for over 10 percent of the total use.

TABLE 2. Estimates of fishermen, hours fished, harvest and approximate 95 percent confidence intervals, Georgetown Lake, winter census 1971-72. (Coefficients of variation are in parentheses).

	Lower limit	Point estimate	Upper limit
<u>Fishermen</u>			
Opening day (stratum I)	671	1,209 (22.25%)	1,747
Weekends and holidays (stratum II)	3,765	4,656 (9.57%)	5,547
Weekdays (stratum III)	3,505	4,304 (9.28%)	5,103
Total for season	8,857	10,169 (6.45%)	11,481
<u>Hours Fished</u>			
Opening day (stratum I)	2,318	4,153 (22.10%)	5,988
Weekends and holidays (stratum II)	13,397	16,504 (9.41%)	19,611
Weekdays (stratum III)	10,262	12,456 (8.81%)	14,650
Total for season	28,891	33,114 (6.38%)	37,337
<u>Harvest</u>			
Opening day (stratum I)	4,487	8,128 (22.39%)	11,769
Weekends and holidays (stratum II)	18,086	22,512 (9.83%)	29,174
Weekdays (stratum III)	19,454	24,314 (9.99%)	29,174
Total for season	47,439	54,954 (6.84%)	62,469

The estimated total weight harvested, derived by multiplying the average weight by the estimated number, is presented in Table 3. The yield of all species combined was 24,983 pounds or 9.0 pounds per acre. This is down from the 13.2 and 13.6 pounds per acre in the winter seasons of 1966-67 and 1969-70, respectively.

TABLE 3. Average length and weight of fish checked by census technicians, and estimated total number and weights of fish taken from the Georgetown Lake 1971-72 winter fishing season.

Species	Avg. Length (in.)	Avg. weight (lbs.)	Est. numbers	Est. weight (lbs)
Rb (1407) ^{1/}	10.6 _{2/}	.48	32,477	15,589
Ct (1)	-	-	1	-
Eb (133)	10.5	.46	2,308	1,062
KOK/SS (717)	10.6	.41	20,058	8,224
Gr (10)	14.5	.98	110	108
			<u>54,954</u>	<u>24,983</u>

^{1/} number of fish weighed and measured in parentheses

_{2/} not recorded

The decrease in yield was due mostly to fewer fisherman-days use (Table 4). Also it was due to the smaller size of fish taken, and the reduction in the allowed limit from 10 pounds and one fish not to exceed 10 fish, plus ten salmon, to ten pounds and one fish not to exceed 10 fish.

TABLE 4. Estimates of fishing pressure, harvest, and hourly catch rates for the Georgetown Lake winter ice-fishing seasons of 1963-1964, 1966-67 and 1969-1970.

	Fishermen	Hours fished	Harvest	Catch per hour
1963-1964 estimates	10,041(71)	41,206	22,561	0.55
1966-1967 estimates	12,329(73)	42,420	58,675	1.38
1969-1970 estimates	14,642(70)	56,399	80,252	1.42
1971-1972 estimates	10,169(73)	33,114	54,954	1.66

Number of angling days in season is shown in parentheses

A sharp increase occurred in the percentage of salmon harvested, although rainbow trout again dominated the catch, totaling 59.1 percent. Salmon accounted for only 14.4 percent of the catch in 1969-70 and nearly tripled in percentage (36.5%) during the 1971-72 season (Table 5). A slight increase in the number of brook trout also occurred. Other species taken were Arctic grayling and cutthroat trout which comprised only 0.3 percent of the total harvest.

TABLE 5. Species composition of harvest, by percent, on Georgetown Lake during the 1963-1964, 1966-1967, 1967-1968, 1969-1970, 1970-1971 and 1971-1972 winter censuses (number of fish checked in parentheses).

Year	Rainbow trout	Cutthroat trout	Kokanee	Brook trout	Grayling
1963-1964	80.9 (3103)	3.5 (135)	8.7 (333)	6.9 (266)	none
1966-1967	89.4 (9663)	0.1 (7)	7.0 (753)	3.6 (386)	none
1967-1968	87.4 (2703)	0.1 (2)	8.9 (274)*	2.1 (64)	1.5 (48)
1969-1970	82.8 (4870)	0.1 (2)	14.4 (849)*	1.8 (105)	0.9 (52)
1970-1971	76.4 (581)	0 (0)	20.4 (155)*	2.2 (17)	0.1 (7)
1971-1972	59.1 (4402)	0.1 (1)	36.5 (2721)*	4.2 (308)	0.2 (17)

*Includes both kokanee and coho salmon

Winter water levels on Georgetown Lake may have an influence on kokanee spawning. Kokanee generally comprised approximately 7 - 9 percent of the winter harvest in census years through 1967-68. Water levels in 1965-66 and 1966-67 fell well below the 6427 foot lake surface elevation mark (Figure 1). In 1968-69, 1969-70 and 1970-71 water levels remained above this point (Figure 2, 3). Many kokanee spawn in shoreline areas near the Anaconda Company pumphouse. A drop in surface elevation of 1-2 feet during March and April would uncover redds or cause scouring by ice movement, subsequently causing kokanee egg mortality. Planting of coho salmon through the 1960's could have also had an effect on kokanee survival. Additional surveillance of water stage-kokanee spawning relationships could provide more concrete information.

The overall catch-rate for the season was 1.66 fish per hour (Table 6) which was higher than that found in previous censuses (Table 7). Opening day and weekday fishermen were more successful than weekend and holiday fishermen (Table 6). The average trip length and average catch per angler were similar to previous censuses. On opening day, 24 percent of the fishermen caught limits, while 71 percent had 5 or more fish. Only 9 percent caught no fish.

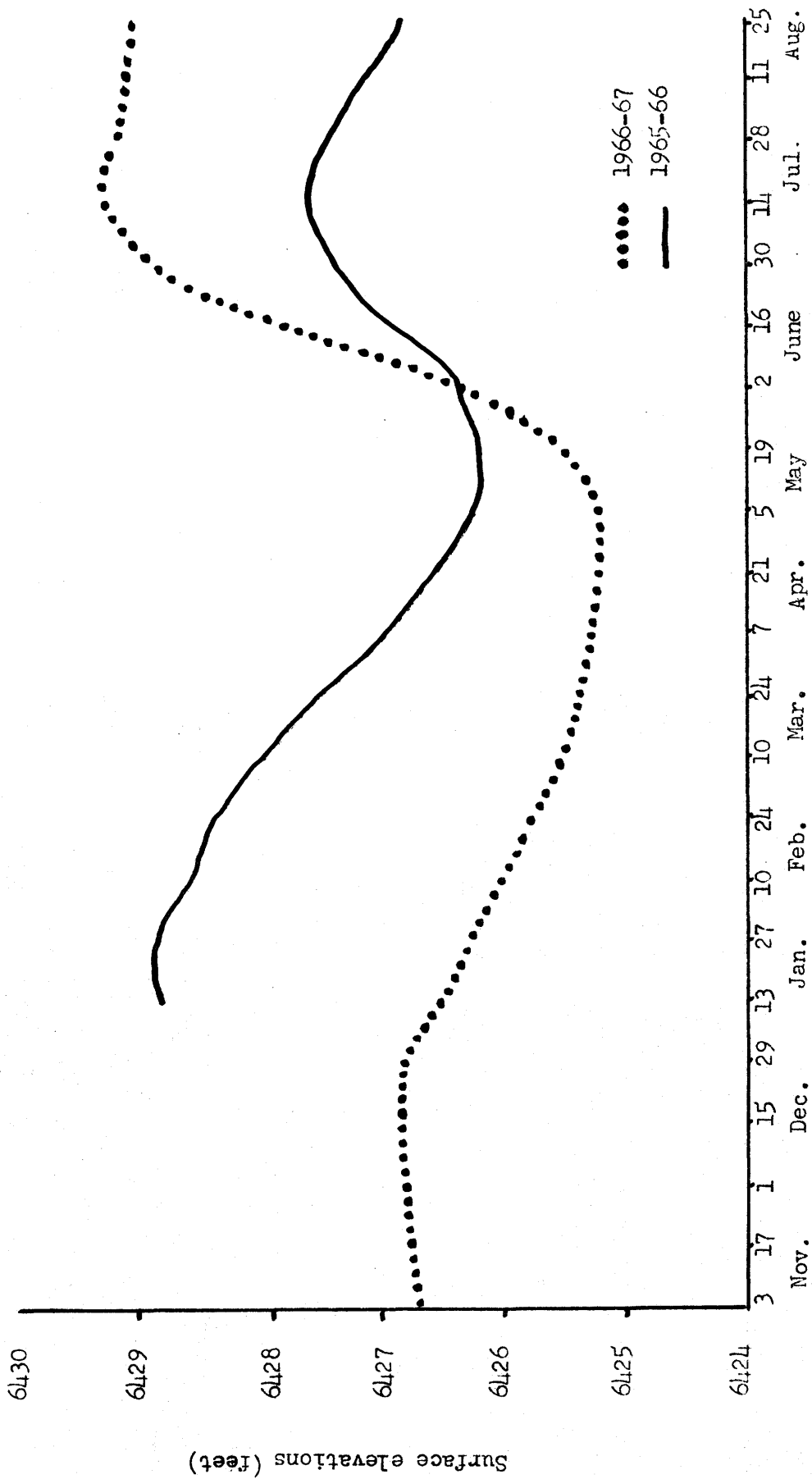


Figure 1. Surface fluctuations for Georgetown Lake for the winter, spring and summer of 1965-66 and 1966-67.

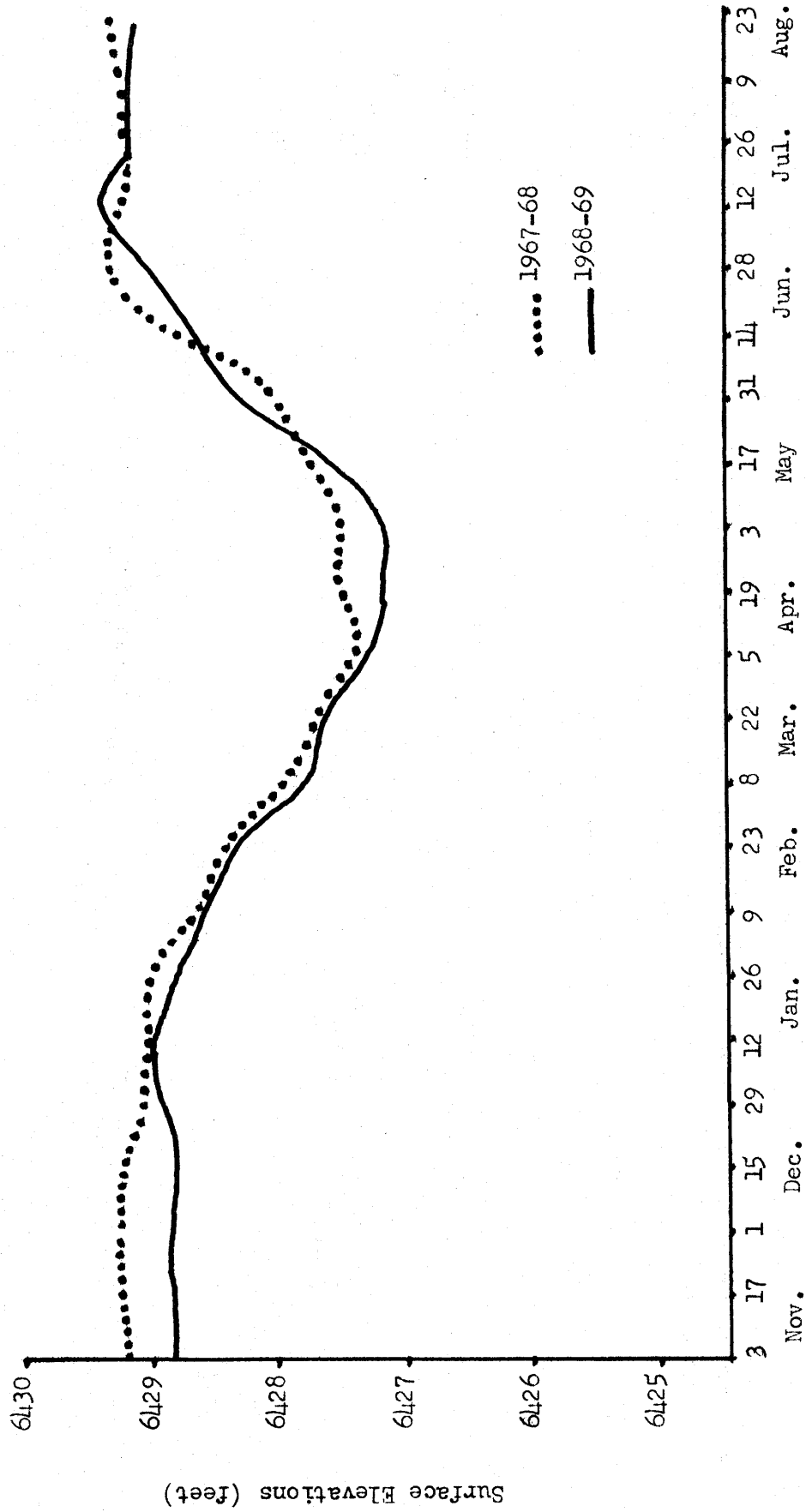


Figure 2. Surface fluctuations for Georgetown Lake for the winter, spring and summer of 1967-68 and 1968-69.

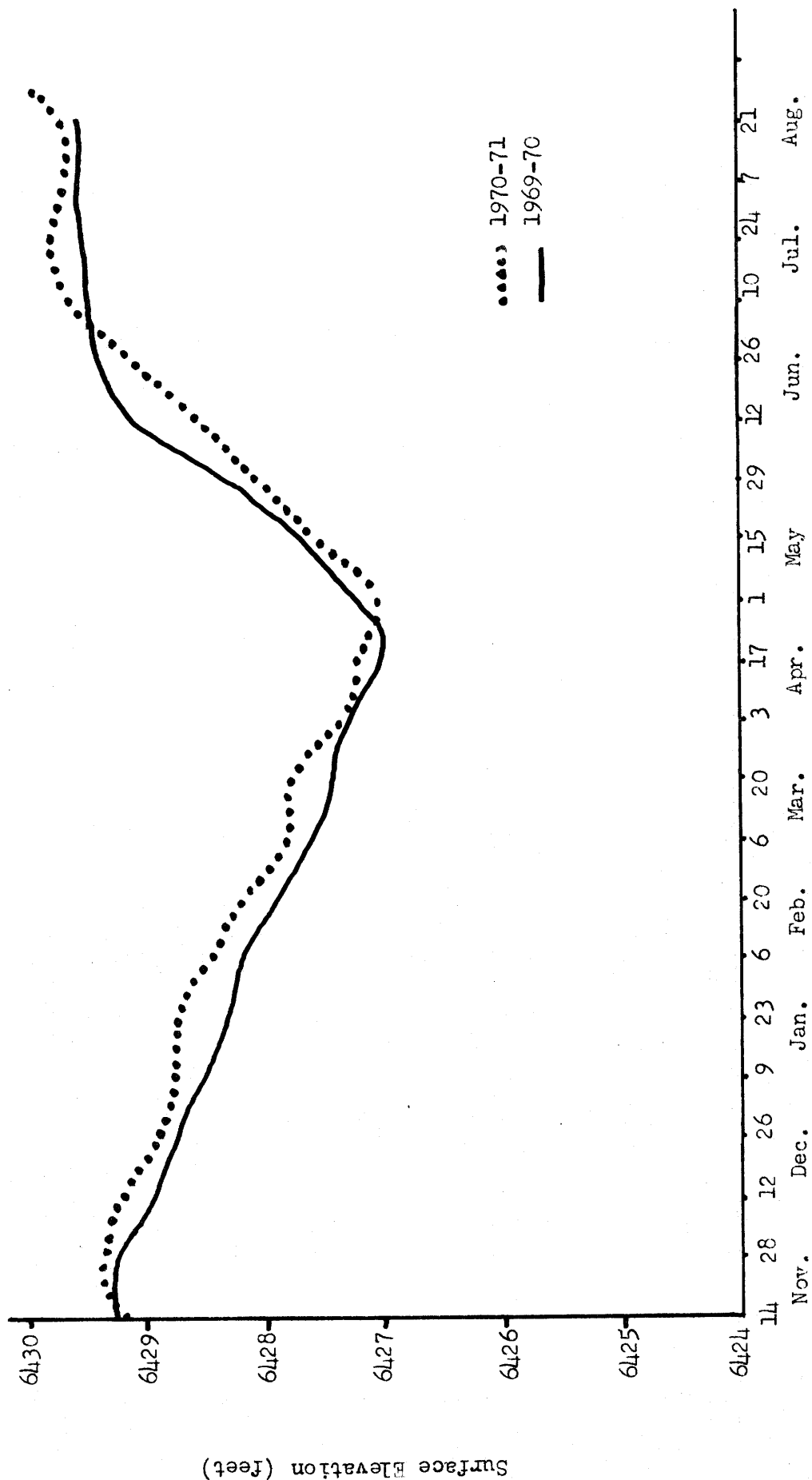


Figure 3. Surface fluctuations for Georgetown Lake for the winter, spring, and summer of 1969-70 and 1970-71.

TABLE 6. Rates of fishing effort and success and 95 percent confidence limits, Georgetown Lake winter census, 1971-72. (Coefficients of variation are shown in parentheses).

	Stratum I - opening day			Stratum II-weekends plus holidays			Stratum III-weekdays except holidays			Entire season		
	Lower* limit	Point est.	Upper* limit	Lower* limit	Point est.	Upper* limit	Lower* limit	Point est.	Upper* limit	Lower* limit	Point est.	Upper* limit
Fish per man	6.329	6.725 (2.94%)	7.121	4.566	4.834 (2.77%)	5.102	5.154	5.650 (4.39%)	6.146	5.156	5.404 (2.29%)	5.652
Hours per man	3.248	3.436 (2.73%)	3.624	3.423	3.545 (1.72%)	3.667	2.724	2.894 (2.94%)	3.064	3.162	3.256 (1.44%)	3.350
Fish per hour	1.813	1.957 (3.68%)	2.101	1.286	1.364 (2.86%)	1.442	1.768	1.952 (4.71%)	2.136	1.580	1.660 (2.11%)	1.740

*The upper and lower limits are the point estimate plus or minus (respectively) twice its standard error and may be interpreted as approximate 95% confidence intervals.

TABLE 7. Comparison of catch per hour, catch per fisherman, and average length of trip during Georgetown Lake winter fishing seasons of 1963-1964, 1966-1967, 1967-1968, 1969-1970, 1970-1971 and 1971-1972.

Year	Catch/hour	Catch/angler	Average Length trip (hours)
1963-1964	.55	2.7	4.1
1966-1967	1.38	4.8	3.5
1967-1968	1.54	5.9	3.8
1969-1970	1.42	5.5	3.8
1970-1971	1.54	4.7	3.3
1971-1972	1.66	5.4	3.3

TABLE 8. Comparison of the average length and weight of fish taken during the 1966-1967, 1967-1968, 1969-1970, 1970-1971 and 1971-1972 Georgetown Lake winter creel censuses.

Year	Species	Ave. length (in.)	Ave. weight (lbs.)
1966-1967	Rb (214)*	11.7	0.68
	Ct (3)	15.1	1.55
	Eb (22)	11.4	0.58
	KOK (34)	12.3	0.69
1967-1968	Rb (306)	11.3	0.60
	Ct (0)	-	-
	Eb (17)	11.0	0.74
	KOK/SS (55)	10.7	0.45
	Gr (10)	9.8	0.30
1969-1970	Rb (247)	11.1	0.52
	Ct (0)	-	-
	Eb (10)	10.1	0.44
	KOK/SS (20)	11.4	0.45
	Gr (4)	13.2	0.77
1970-1971	Rb (555)	10.1	0.40
	Ct (0)	-	-
	Eb (12)	9.9	0.38
	KOK/SS (149)	10.9	0.46
	Gr (7)	13.3	0.81
1971-1972	Rb (1407)	10.6	.48
	Ct -	-	-
	Eb (133)	10.5	.46
	KOK/SS (717)	10.6	.41
	Gr (10)	14.5	.98

*Number in sample

A slight increase occurred in the average length and weight of rainbow trout compared to the 1970-71 census (Table 8). The averages were still less than those found in winter censuses in 1966-67 and 1969-70, when average lengths and weights were over 11.0 inches and 0.52 pounds, respectively.

Condition factors increased slightly above those found in two prior winter censuses (Table 9).

TABLE 9. Condition Factors (C)^{1/} of rainbow trout weighed and measured during 1963-1964, 1966-1967, 1967-1968, 1969-1970, 1970-71 and 1971-1972 Georgetown Lake winter creel censuses.

Year	Size range (inches)	Sample size	Average (C) value
1963-1964	7.0-11.9	24	36.7
	12.0 and over	49	37.4
All sizes combined		<u>73</u>	<u>37.2</u>
1966-1967	7.0-11.9	148	38.3
	12.0 and over	66	37.6
All sizes combined		<u>214</u>	<u>38.0</u>
1967-1968	7.0-11.9	198	36.9
	12.0 and over	108	36.6
All sizes combined		<u>306</u>	<u>36.8</u>
1969-1970	7.0-11.9	173	35.9
	12.0 and over	74	34.8
All sizes combined		<u>247</u>	<u>35.6</u>
1970-1971	7.0-11.9	471	35.8
	12.0 and over	84	35.4
All sizes combined		<u>555</u>	<u>35.8</u>
1971-1972	7.0-11.9	1049	36.9
	12.0 and over	357	36.2
All sizes combined		<u>1406</u>	<u>36.7</u>

^{1/}C values were determined for individual fish and then averaged. Condition Factor alignment charts produced by the Montana Fish and Game Department (Prog. Fish-Culturist) were used for data from 1963-64 through 1969-70. Computations for 1970-71 and 1971-72 were made by computer.

RECOMMENDATIONS

It is recommended that an additional ten kokanee be allowed in the summer and winter fishing seasons. If little improvement is shown in size and condition of rainbow trout during the winter fishery of 1972-73, additional reductions in the number planted should occur.

Studies should be encouraged on lake limnology, particularly with respect to nutrient inflow and utilization. Water levels should be plotted annually to determine if trends develop with respect to kokanee population fluctuation.

The Georgetown Lake management plan should be followed as closely as possible and updated when necessary.

LITERATURE CITED

Spence, L. 1970. Georgetown Lake Winter Creel Census. Job Progress Report, Federal Aid in Fish and Wildlife Restoration Acts. Montana Project No. F-12-R-16, Job No. I-b, 12 pp.

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Water referred to:

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